



RONDEBOSCH BOYS' HIGH SCHOOL

GRADE 11 MATHEMATICS PAPER 2

20 JUNE 2014

TIME: 2 HOURS

MARKS: 100

EXAMINER: T EDWARDS

MODERATOR: P GHIGNONE

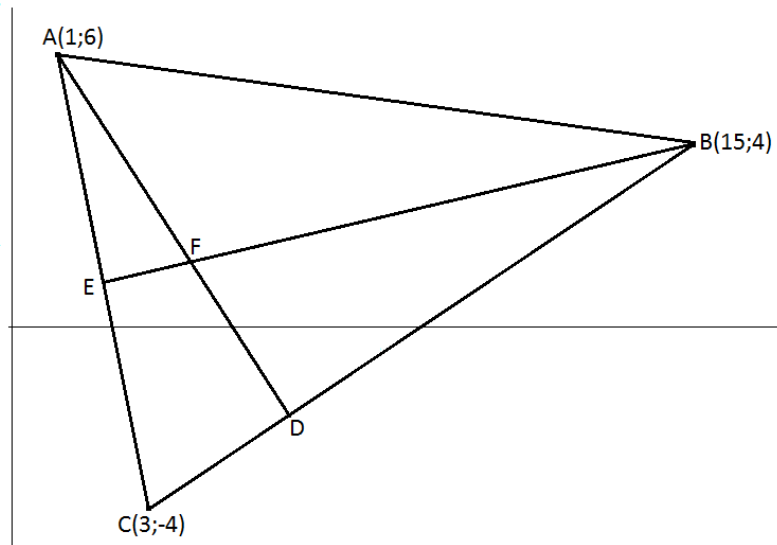
INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of 7 QUESTIONS
2. Answer ALL the questions.
3. Clearly show ALL calculations, diagrams, graphs, et cetera which you have used in determining the answers.
4. Answers only will NOT necessarily be awarded full marks.
5. You MAY use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
6. If necessary, round off answers to TWO decimal places.
7. Number the answers correctly according to the numbering system used in this question paper.
8. Begin each question on a NEW PAGE.
9. Write neatly and legibly.

Question 1

The figure represents $\triangle ABC$ with $A(1; 6)$, $B(15; 4)$ and $C(3; -4)$. The altitude AD cuts the median BE at F .



Determine:

- 1.1 The length of AC , correct to two decimal places. (2)
- 1.2 The co-ordinates of E , the midpoint of AC . (2)
- 1.3 The gradient of line BC . (2)
- 1.4 The equation of altitude AD . (4)
- 1.5 The angle of inclination of BC . (2)
- 1.6 The size of \hat{ACB} . (4)

[16]

Question 2

- 2.1 Given $M(5; 7)$, $N(a; 8)$, $O(-1; 9)$ and $P(0; 4)$. Determine, with calculations, the value of a if:
 - 2.1.1 MN is perpendicular to OP . (4)
 - 2.1.2 $NO = NP$ (4)
- 2.2 Determine the value of p if the straight line defined by the equation $px + 3y = 6$ has an angle of inclination of 135° with respect to the positive x -axis. (4)
- 2.3 Calculate the value of k if the points $A(6; 5)$, $B(3; 2)$ and $C(2k; k + 4)$ are collinear. (4)

[16]

Question 3

Given $12\tan\beta = 5$ where $\beta \in [90^\circ; 360^\circ]$.

3.1 Represent this information in a sketch in the correct quadrant. Clearly indicate the position of the angle, β . (3)

3.2 Hence calculate the following without using a calculator

3.2.1 $\cos\beta$ (2)

3.2.2 $\sqrt{1 + \tan^2\beta}$ (3)

3.3 Find β correct to TWO decimals. (2)

[10]

Question 4

Calculate the value of the following, without using a calculator.

4.1 $\frac{\sin(-30^\circ)\sin 10^\circ}{\cos 80^\circ\cos 225^\circ}$ (6)

4.2 $\tan(180^\circ + x) \cdot \cos(540^\circ + x) \left[\sin(-x) + \frac{\sin^2(90^\circ - x)}{\cos(x + 90^\circ)} \right]$ (9)

[15]

Question 5

5.1 Prove that: $\tan^2\theta + 1 = \frac{1}{\cos^2\theta}$ (4)

5.2.1 Prove that: $\frac{8}{\sin^2 C} - \frac{4}{1 + \cos C} = \frac{4}{1 - \cos C}$ (6)

5.2.2 For which value(s) of $C \in [0^\circ; 360^\circ]$ is $\frac{8}{\sin^2 C} - \frac{4}{1 + \cos C} = \frac{4}{1 - \cos C}$ undefined? (3)

[13]

Question 6

Solve for x as required:

6.1 $\cos x = 0,766$ $x \in [90^\circ; 360^\circ]$ (1)

6.2 $\tan x = \frac{\cos(90^\circ - x)}{\cos(360^\circ - x)}$ $x \in [0^\circ; 360^\circ]$ (4)

6.3 $2\cos(x + 15^\circ) = \sin(x + 15^\circ)$ $x \in [0^\circ; 360^\circ]$ (5)

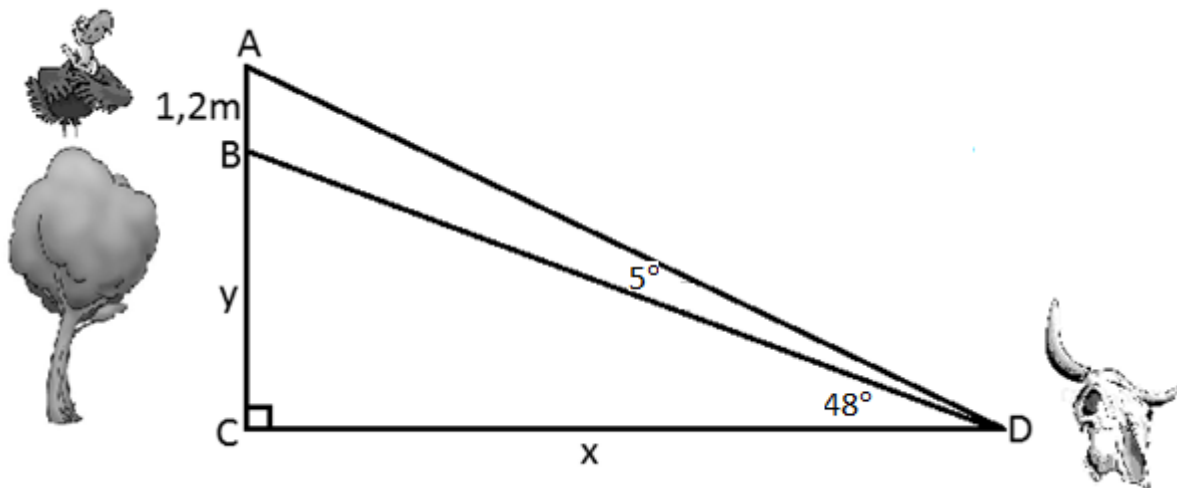
6.4 $\cos^2 x + 3\sin x = -3$ General Solution (7)

6.5 If $m - m^{-1} = 2$ and $m^2 + m^{-2} = 7\sin x$, determine the size of x if $0^\circ \leq x \leq 360^\circ$. (6)

[23]

Question 7

A vulture sitting on the highest point of a tree looks at a carcass lying on the ground. The angle of elevation from the carcass to the top of the tree is 48° . The angle of elevation from the carcass to the top of the vulture's head is 53° . The height of the vulture (AB) is 1,2m. Calculate the distance of the carcass from the base of the tree (x).



[7]